Timm discloses modulating the carrier with user data for transmission (prior art, Figure 4a). *Timm* also discloses using pilot tones in an HWWN digital transmission architecture (col.15, lines 40-41). However, *Timm* does not disclose or even suggest that the pilot carrier is modulated with part of the user data element.

In fact, *Timm* specifically discloses a Carrierless Amplitude Modulation/Phase Modulation (CAP) MDSL modem (col. 10, lines 14-15). With CAP, a separate tone for synchronization is not used because synchronization is achieved by transmitting the data signal directly. At startup, a special data sequence is used to train equalizers in the CAP receiver before real data is transmitted (col.10, lines 21-25; col.5, lines 41-47). Thus, a pilot carrier is not used in CAP MDSL modem. In that respect, CAP is irrelevant to the present invention.

It is respectfully submitted that *Timm* also discloses a Quadrature Amplitude Modulation (QAM) scheme. The difference between CAP and QAM is that CAP performs most of its processing in the passband, while QAM performs of its processing at baseband. However, the synchronization is also achieved using the transmit data signal directly as CAP is only a special case of QAM (col.10, lines 14-25). Thus, QAM is irrelevant to the present invention.

Timm further mentions Discrete Multi-Tone (DMT) (col.5, lines 33-36). *Timm* discloses a time domain training sequence containing a basic unit of random data block (Figure 9a; col.29, lines 18-24) and a pilot tone superimposing on the training sequence (col.29, lines 29-51). However, the DMT modulation scheme disclosed in *Timm* operates according to ANSI T1E1.413-1995 as disclosed in the background part of the specification, wherein the data modulated onto the pilot carrier is a constant (0,0). *Timm* does not disclose or even suggest that the pilot carrier is modulated with part of the user data elements in order to enlarge effective bandwidth for transport of the *user data* elements.

Thus, claims 4, 6 and 10 are distinguishable over the *Timm* reference.

As for claims 5, 7-9, 11 and 12, they are dependent from claims 4, 6 and 10 and recite features not recited in claims 4, 6 and 10. For reasons regarding claims 4, 6 and 10 above, it is respectfully submitted that claims 5, 7-9, 11 and 12 are also distinguishable over the *Timm* reference.

At page 3 of the office action, the Examiner disagrees with applicant's argument that *Timm* does not disclose that the pilot carrier is modulated with part of the user data element. At page 4, the Examiner again points to column 5 lines 40 to 47; column 7 lines 50 to 60; and column 29 lines 24 to 55 for disclosing the training sequence, the pilot tone and the data elements are multiplexed and superimposed to make efficient used of the bandwidth.

At column 5, lines 40-47, *Timm* discloses that:

> One of the specific modulation schemes chosen for one implement of MDSL is Carrierless AM/PM (CAP). *CAP does not make use of a separate tone for synchronization.* Synchronization is achieved by using the transmitted data signal directly. At startup, a special data sequence is used to train equalizers in the CAP receiver before real data is transmitted. (*italics added*)

Because CAP does not have a separate tone, such as a pilot tone, for synchronization, there is no modulation of the pilot carrier by part of the user data. Thus, CAP is irrelevant to the present invention wherein the pilot carrier is modulated with part of the user data elements.

At column 7 lines 50 to 60, *Timm* discloses that:

> This invention also provides point-to-point delivery of communication services and more particularly to distribution methods which integrate wire and wireless systems via modems into an efficient digital signal distribution network designated a Hybrid Wireless Wire-Line Network (HWWN). A key element included in this system architecture is bandwidth management feature which provides for efficient use of the available based on user demands for data rates and channel transmission conditions.

It is respectfully submitted that the details of HWWN are described in conjunction with Figure 2d. *Timm* discloses, at column 11, line 24 to column 15, line 55, how HWWN is carried out. In particular, *Timm* discloses, at column 11, lines 31-53, that signals are digitized and sent via an optical feeder link to a wireless distribution node, wherein various techniques are employed to modulate the RF carrier; that RF signals are translated to IF and to a low carrier frequency signal coupled to a DSL, a VDSL or a MDSL; and that the capabilities of high speed modems are used, and wired and wireless distribution technology is established in an integrated

transmission network. No mentioning of using part of the user data to modulate the pilot tone in this section.

Timm discloses, at column 12, lines 26 to 44, that as a higher level modulation scheme, 64 QAM is used to make effective use of any available spectrum; that QPSK modulation is incorporated with adaptive channel band control and spatial diversity is used to reduce system interference; and that a variety of satellite and terrestrial based systems are used as distribution systems. There is no mentioning of using part of the user data to modulate the pilot tone in this section.

Timm discloses, at column 15, lines 17 – 31, that MMDS is used in two way high speed data communications and a second telephony line is added, and that QAM modulation is used for digital video MMDS systems in order to reduce interference. No mentioning of using part of the user data to modulate the pilot tone in this section.

Timm further discloses, at column 15, lines 32-51, how system bandwidth is controlled and allocated based on varying data capacity demands, data rates and interference encountered. *Timm* uses an 850 MHz spectrum allocation as an example. *Timm* mentions that "the data rate per 40MHz channel is 37.056 Mbps accounting for overhead and pilot tones. *Timm* mentions the used of faster digital modems or sectorizing to increase the channel rate, and finally, "A HWWN digital transmission embodiment employing QAM modulation and interference measurement and control capabilities could potentially provide several more RF channels to increase capacity or provide higher data rate". No mentioning of using part of the user data to modulate the pilot tone in this section.

At column 29 lines 24 to 28, *Timm* discloses that

> For easy description purposes, the following notation are used: time domain equalizer taps w_l; channel impulse (including time domain of equalizer) h_k; the receiver data before the equalizer $y_m[n]$, and after the equalizer $z_m[n]$, where m denotes the label on data block.

At column 29, lines 39 - 51, *Timm* gives the relation between $z_m[n]$, x_j, h_k and p_n, for m=1 to 5,

where p_n is the pilot tone superimposed on the training sequence. The second terms on the right hand side of the equations are attribute to the inter-symbol interference from the previous frame. The second term can be separated from the first term by performing the operation: frame 4- frame 1:

$$err[n] = z_4[n] - z_1[n]$$

and x_j is shown in Figures 9a, 9c and 9d. At column 5, lines 33 – 36, and column 29, lines 18 – 24, *Timm* mentions Discrete Multi-Tone (DMT) and discloses a time domain training sequence containing a basic unit of random data block to be superimposed on by the pilot tone. However, the DMT modulation scheme disclosed in *Timm* operates according to ANSI T1E1.413-1995 as disclosed in the background part of the specification, wherein the data modulated onto the pilot carrier is a constant (0,0). There is no mentioning of using part of the user data to modulate the pilot tone in this section.

Based on the above analysis, *Timm* does not disclose or even suggest that the pilot carrier is modulated with part of the user data elements in order to enlarging effective bandwidth for transport of the *user data* elements in this section.

CONCLUSION

Claims 4-12 are distinguishable over the cited *Timm* reference. Early allowance of claims 4-12 is earnestly solicited.

Respectfully submitted,

Ken Lao

WARE, FRESSOLA, VAN DER SLUYS
& ADOLPHSON LLP
Bradford Green, Building Five
755 Main Street, P.O. Box 224
Monroe, CT 06468
Telephone: (203) 261-1234
Facsimile: (203) 261-5676
USPTO Customer No. 004955

Kenneth Q. Lao
Attorney for the Applicant
Registration No. 40,061